PATENT SPECIFICATION (11) 1306357

1306357

DRAWINGS ATTACHED

(21) Application No. 45230/69 (22) Filed 13 Sept. 1969

(23) Complete Specification filed 1 Sept. 1970

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(51) International Classification F16B 13/06

(52) Index at acceptance F2H 16B 16C 16D 16E 17AU

(72) Inventor STANLEY ALFRED RINGHAM

(19)

(54) FIXING, FASTENING OR LOCATING INSERT

(71) We, ADBAR (PATENT CO.) LIMITED, a British Company of Masons Road (formerly of 18 Central Chambers) Stratford-on-Avon, Warwickshire, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to fixing, fastening or locating inserts wherein the insert is installed in a hole therefor in parent material. Such inserts usually, but not necessarily, have a threaded bore or shank for receiving a threaded member such as a screw or nut as the case may be and are widely used in components made of metal, plastics or other material.

The object of this invention is to provide such an insert which is of simple and inexpensive form capable of rapid installation and which in particular has a high resistance to pull out after installation. Practical advantages in these and other respects will be apparent from the following disclosure.

According to this invention a fixing, fastening or locating insert is characterised by a body member at least part of which is of external taper form between larger and smaller ends thereof and being for end location by its larger end at the inner end of a hole therefor in parent material; and a radially expansible sleeve or ferrule having an internally chamfered leading end providing a cutting edge and adapted to be axially driven over the smaller end of the body member and about the taper part thereof when said body is positioned in a said hole whereby the ferrule is expanded to an exterior taper form to shear by its cutting edge material from the wall of the hole such that the ferrule has a taper engagement with the hole wall sheared to a corresponding taper form and with the body member to lock the ferrule and body member in the hole against axial pull out.

In the accompanying drawings:—

FIGURE 1 is an elevation of the insert body member and sleeve or ferrule prior to assembly, the body member being shown in position in a hole therefor;

FIGURE 2 is an axial plane section of the body member and ferrule fully installed in a hole;

FIGURE 3 is an elevation of the body member and ferrule in a detachably assembled condition ready for use;

FIGURE 4 is an elevation of a male insert assembly shown installed in a hole;

FIGURE 5 is an elevation showing a developed form of the body member, and

FIGURE 6 is an axial plane section of the body member and ferrule fully installed and showing a modification.

Like parts are referred to by the same or similar reference numerals throughout the drawings.

Referring to FIGURES 1 and 2 the insert comprises a body member 1 and a sleeve or ferrule 2. The insert body 1 is of external taper form at 10 and shown provided with an internal threaded bore 11 for receiving a screw or similar threaded member whilst the ferrule 2 is preferably split longitudinally at 20 so as to be radially expansible and is internally chamfered to provide a cutting edge 21 at its leading end.

In one way of using the insert the body 1 is placed in a hole 3 therefor of appropriate diameter in parent material 4 with its larger diameter end at the bottom or inner end of the hole 3. The leading end of the ferrule 2 is initially positioned in the hole 3 about the smaller diameter end of the body 1 (FIGURE 1) and driven or subject to axial pressure whereby it fully enters the hole 3 and expands about the exterior taper form 10 of the body 1 (FIGURE 2).

As the ferrule 2 is driven in this way its leading cutting edge 21 shears material from the wall 30 of the hole 3, the cut away material being displaced to, and subject to some compression at, an inner part of the hole 3 at 31. At the same time the ferrule 2 assumes a taper form presenting an external taper formation 22 to the hole wall 30 which is cut to a corresponding taper form at 32. As a result of such taper engagement both the ferrule 2 and the insert body 1 become firmly locked in the hole 3 and resist to a very high degree

SEE ERRATA SLIP ATTACHED

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This invention relates to fixing, fastening or

of ferrule having an internally chamfered leading end providing a cutting edge and adapted to be axially driven over the smaller end of the body member and about the taper part thereof when said body is positioned in a said hole whereby the ferrule is expanded to an exterior taper form to shear by its cutting edge material from the wall of the hole such that the ferrule has a taper engagement with the hole wall sheared to a corresponding taper form and with the body member to lock the ferrule and body member in the hole against axial pull out.

In the accompanying drawings:—

FIGURE 1 is an elevation of the insert body member and sleeve or ferrule prior to assembly, the body member being shown in position in a hole therefor;

FIGURE 2 is an axial plane section of the body member and ferrule fully installed in a hole;

FIGURE 3 is an elevation of the body member and ferrule in a detachably assembled condition ready for use;

FIGURE 4 is an elevation of a male insert assembly shown installed in a hole;

FIGURE 5 is an elevation showing a developed form of the body member, and

ERRATA

SPECIFICATION No. 1,306,357

Page 3, line 1, *after* having *insert* an internally chamfered

Page 3, line 2, *delete* an internally chamfered

Page 3, line 47, *for* 3 *read* 5

THE PATENT OFFICE
3rd December, 1973

is initially positioned in the hole 3 about the smaller diameter end of the body 1 (FIGURE 1) and driven or subject to axial pressure whereby it fully enters the hole 3 and expands about the exterior taper form 10 of the body 1 (FIGURE 2).

As the ferrule 2 is driven in this way its leading cutting edge 21 shears material from the wall 30 of the hole 3, the cut away material being displaced to, and subject to some compression at, an inner part of the hole 3 at 31. At the same time the ferrule 2 assumes a taper form presenting an external taper formation 22 to the hole wall 30 which is cut to a corresponding taper form at 32. As a result of such taper engagement both the ferrule 2 and the insert body 1 become firmly locked in the hole 3 and resist to a very high degree

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axial load tending to pull the insert body 1 from the hole 3.

In practice the angle of the exterior taper form 10 of the body 1 may be of the order of 5° but it is emphasised that this value is given by way of example only and may be varied according to requirements.

Dependent on the nature of the parent material 4, expansion of the ferrule 2 to the taper form may mainly or wholly effect displacement or deformation of the material at the hole wall 30 for obtaining locking taper engagement with the latter.

The ferrule 2 is preferably driven below the surface of the parent material 4 by a driving tool 5 having or including a tubular leading end. As will be appreciated and by such a tool the inserts may be rapidly installed either by manual operation or automatically in a suitable press or machine. In FIGURE 2 the ferrule 2 is shown recessed into the parent material i.e. below the short parallel or uniform diameter portion or land 12 at the smaller diameter end of the body 1.

Whereas the ferrule 2 may be initially positioned about the body 1 after the body 1 has been placed in a hole 3, for convenience in handling the body 1 and ferrule 2 as a unit i.e. for initial insertion in a hole 3 and also for packaging and storage purposes, the leading end of the ferrule 2 may be fitted about the smaller diameter end of the body 1 such as about a short parallel or uniform diameter portion or land 12 at said end with a gripping fit sufficient to hold the body 1 and ferrule 2 together. The unit or assembly provided in this way can be positioned in a hole 3 and the ferrule 2 driven home in the manner already described.

In an alternative arrangement of providing a unit or assembly ready for installation the ferrule 2 is detachably assembled about the insert body 1 (FIGURE 3) where due to the inherent resiliency of the ferrule 2 it tends to contract about the tapered exterior 10 of the body 1 such that the rear end 23 of the ferrule abuts the uniform diameter portion or land 12 for retention of the ferrule 2 on the body 1. When required for installation the ferrule 2 can be readily pushed off the body 1 or the assembly can be initially inserted in a hole 3 with the leading or cutting end 21 of the ferrule 2 resting on the parent material 4 about the hole 3. By a suitable punch or tool the body 1 is then pushed through the ferrule 2 fully into the hole 3 and then followed by driving home the ferrule 2. Particularly for this arrangement of unit assembly the ferrule 2 may have some taper formation in the free condition.

In FIGURE 4 the arrangement and modes of installation of the insert body 1 and ferrule 2 are the same as that already described except that the body 1 is provided with a shank 14 which is shown threaded to provide a male insert for receiving a nut or similar threaded member.

In a development shown in FIGURE 5 the insert body 1 is provided with an extension 15 of parallel or uniform diameter corresponding to the diameter of the larger end of the body 1 and the diameter of the hole 3 receiving the insert. The extension may be of any suitable length dependent on the overall length of the insert that is required and provides coaxial location of the body 1 in the hole 3.

Referring to FIGURE 6 a modification is shown in which the expansible ferrule 2*a* has an internal taper bore 24 for co-action with the taper exterior 10 of the insert body 1 in expanding the ferrule 2*a* which latter is shown having a substantially parallel or uniform diameter exterior periphery which is knurled, serrated or barbed at 25 or similarly formed for biting or frictional engagement with the wall 30 of the hole 3 receiving the insert. If desired the exterior of the ferrule 2*a* may be of taper form or assume such form in use and also has a shearing action in the manner of the ferrule 2 of FIGURES 1 to 5 and as a development thereof.

In order to be readily expansible the ferrule 2,2*a* is preferably split as at 20 in the manner already described, the split 20 engaging parent material of the hole wall 30 to resist rotation of the installed insert in the hole 3. However the ferrule 2,2*a* need not be split and may be arranged to be expanded by deformation as it is driven about the body 1.

Whereas for most practical requirements the insert body 1 and ferrule 2 or 2*a* are of round cross section it is to be understood that they may be of non-circular cross section e.g. of elliptical, square, hexagonal or irregular cross section. Furthermore and although usually of a suitable metal the body 1 and/or ferrule 2,2*a* may be of other material e.g. plastics material especially where electrical or other insulation is required and dependent on the nature of the parent material 4.

Thus the body 1 may be of plastics or other insulating material i.e. to receive a metal screw (in which case the threaded bore 11 should be closed or blind at the inner end) or a plastics body 1 may be moulded about a metal shank or stud 14 (FIGURE 4).

It is also to be understood that the bore 11 or shank 14 of the insert body 1 as the case may be can be of plain or other suitable form dependent on particular fixing, fastening or location requirements whilst other modifications or variations may be made within the scope of this invention as claimed herein.

WHAT WE CLAIM IS:—

1. A fixing, fastening or locating insert characterised by a body member at least part of which is of external taper form between larger and smaller ends thereof and being for end location by its larger end at the inner end of a hole therefor in parent material, and a ra-

dially expansible sleeve or ferrule having leading an internally chamfered end providing a cutting edge and adapted to be axially driven over the smaller end of the body member and about the taper part thereof when said body is positioned in a said hole whereby the ferrule is expanded to an exterior taper form to shear by its cutting edge material from the wall of the hole such that the ferrule has a taper engagement with the hole wall sheared to a corresponding taper form and with the body member to lock the ferrule and body member in the hole against axial pull out.

2. An insert according to claim 1 wherein the ferrule is split longitudinally so as to be radially expansible.

3. An insert comprising a round section body member at least part of which is of external co-axial taper form between a smaller diameter end and a larger diameter end of the body member, said body member being such as to end locate by its larger diameter end at the inner end of a plain hole therefor of appropriate size in parent material; and a ferrule which is split longitudinally so as to be radially expansible, said ferrule being internally chamfered at its leading end to provide a cutting edge and is adapted to be axially driven over the smaller diameter end of the body member and about the taper part thereof when said body member is positioned in a said hole whereby the ferrule is expanded to an exterior taper form to shear by its cutting edge material from the wall of the hole and displace the sheared material towards the inner end of the hole such that the ferrule has a taper engagement with the hole wall sheared to a corresponding taper form and with the body member to lock the ferrule and body member in the hole against axial pull out, the longitudinal split of the ferrule also engaging the hole wall and body member to resist rotation of the latter in the hole.

4. An insert according to any of the preceding claims wherein the ferrule has a taper formation in the free condition.

3. An insert according to any of the preceding claims wherein the smaller end of the body member is provided with a short parallel or uniform diameter portion or land.

6. An insert according to claim 5 and any of the preceding claims wherein the short parallel or uniform diameter portion or land receives the ferrule with a gripping fit sufficient to hold the body member and ferrule together for handling the insert as a unit prior to and during installation.

7. An insert according to any of claims 1 to 5 wherein the external taper part of the body member receives the ferrule expanded about it in order to retain the body member and ferrule together for handling the insert as a unit prior to and during installation.

8. An insert according to any of the preceding claims wherein the exterior periphery of the ferrule is formed such as by knurling, serration or barbing for frictional or biting engagement with the wall of a hole receiving the insert.

9. A fixing, fastening or locating insert substantially as herein described with reference to any of the embodiments thereof shown in the accompanying drawings.

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1306357 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

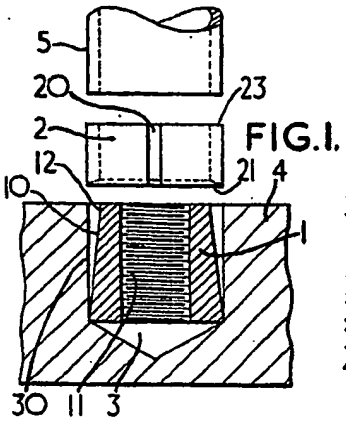

FIG.1.

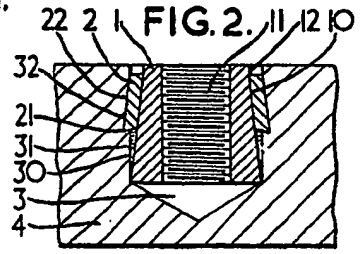

FIG.2.

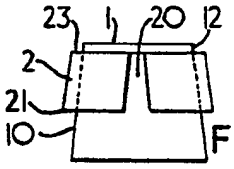

FIG.3.

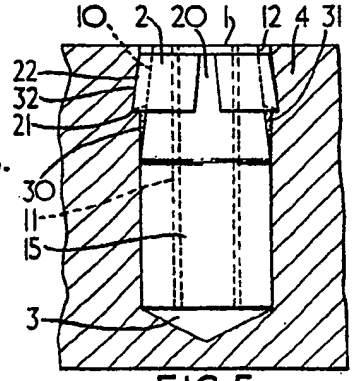

FIG.5.

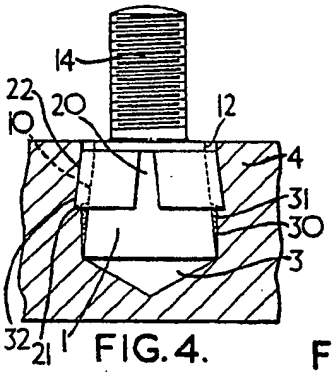

FIG.4.

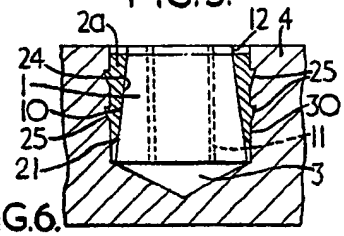

FIG.6.